Understanding DNA and Gene Cloning

A GUIDE FOR THE CURIOUS

Fourth Edition

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EXHIBIT 1

origin of replication a special nucleotide sequence that serves as a start signal for DNA replication. (p. 45)

oxidative phosphorylation ATP formation driven by energy from high-energy electrons derived from the breakdown of sugars and other large molecules.

packaging cells mammalian cells that contain viral genes for the production of viral proteins required for proper assembly of virus particles. Packaging cell lines are used to make virus particles containing defective viral genomes that can carry engineered human genes for gene therapy. (Figure 12-7)

pathogen a disease-causing agent (e.g., viruses that cause polio, mumps, or measles; bacteria that cause cholera, tuberculosis, or leprosy).

pathogenicity island a block of nucleotide sequence that is associated with the ability of some bacterial strains to infect host cells.

PCR see polymerase chain reaction. (Figure 8-5)

penicillin an antibiotic that kills *E. coli* and many other bacteria by blocking formation of new cell walls. Natural penicillin is produced by a mold.

peptide a short chain of amino acids, a fragment of a protein. (Figure 1-5)

peptide bond the type of chemical bond that links two adjacent amino acids together in a protein chain. (Figure 1-5)

phage a virus that attacks bacteria; abbreviation of bacteriophage. (Figure 6-5)

phage plaques clear zones, created by bacteriophages killing bacteria in a lawn of bacteria on an agar plate. (Figure 6-6)

phosphate a chemical unit in which four oxygen atoms are joined to one phosphorus atom. The backbones of DNA and RNA are alternating phosphate and sugar units. (Figure 2-4)

phospholipid a fatty substance (lipid) with a phosphate at one end.

phosphorylation the process of adding a phosphate group to a molecule.

physical map a representation of a DNA molecule in which the relative positions of regions are determined by physical measurements, such as by electron microscopy, restriction analysis, or nucleotide sequence determination, as opposed to frequency of genetic recombination.

pilus (plural, **pili**) a filamentous appendage of bacterial cells involved in conjugation. (Figure 6-2)

pipette a precisely marked glass tube used for measuring liquid volumes.

plasmids small, circular DNA molecules found inside bacterial cells. Plasmids reproduce every time the host bacterial cell reproduces. (Figure 6-1)

plaque a hole or clear zone formed in a lawn of bacteria on an agar plate through the lethal action of bacterial viruses. (Figure 6-6)

polarity directionality, having a left and a right end.

polyadenylated a property of eukaryotic mRNA consisting of a stretch of adenylates at the 3′ end of the RNA.

polyclonal derived from a variety of cell lines; generally refers to a population of antibodies generated by cells that each produce a slightly different antibody molecule.

polymerase chain reaction (PCR) a test tube reaction in which a specific region of DNA is amplified many times by repeated synthesis of DNA using DNA polymerase and specific primers to define the ends of the amplified region. (Figure 8-5)

polyprotein a long protein that is cleaved into several smaller proteins. The smaller proteins are thought to be the functional forms.

precipitate molecules that are clumped together so that they fail to pass through a filter. Precipitates are large aggregates that settle out of solution rapidly, much like silt out of river water. (Figure 3-8)

prenatal before birth.

primer a piece of DNA or RNA that provides an end to which DNA polymerase can add nucleotides. (Figures 3-8, 8-5)

probe a DNA or RNA molecule, often radioactive, that is used to locate a complementary RNA or DNA by hybridizing to it. Often a probe is used to identify bacterial colonies that contain cloned genes and to detect specific nucleic acids following separation by gel electrophoresis. (Figure 8-2)

product the new molecules produced by a chemical reaction.

progenitor a originator of a line of descent.

progeny offspring.

programmed cell death cell suicide that arises from the action of proteins that have evolved for self-destruction, apoptosis.

prokaryote an organism lacking a true nucleus or other organelles.

promoter a short nucleotide sequence on DNA where RNA polymerase binds and begins transcription. (Figure 4-6)

protease an enzymatic protein that breaks down other proteins.

proteome the amino acid sequences for all proteins encoded by the genome of an organism.

protein a class of long, chainlike molecules often containing hundreds of links called amino acids. Twenty different types of amino acid are used to make proteins. The thousands of different proteins serve many functions in the cell. As enzymes, they control the rate of chemical reactions, and as structural elements they provide the cell with its shape. Proteins are also involved in cell movement and in the formation of cell walls, membranes, and protective shells. Some proteins also help package DNA molecules into chromosomes. (Figure 1-5)